

# **Neglected Risk Regulation: the institutional attenuation phenomenon**

**Henry Rothstein**

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# Neglected Risk Regulation: the institutional attenuation phenomenon

Henry Rothstein<sup>1</sup>

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## Abstract

This paper considers the institutional factors that shape regulatory officials' perceptions of risks to human health and safety and their attitudes towards associated regulation. In particular, the paper considers the extent to which the perceptions of risk and regulation of officials responsible for monitoring and enforcement are aligned with regulatory requirements, and, if not, what factors explain those perceptions. Moreover, the paper considers the impact of officials' perceptions and attitudes on policy processes and outcomes. Empirically, the paper considers three UK risk regulation regimes: occupational exposure to radon, chemical migration from plastics food packaging, and BSE-related controls on specified bovine offal. Analysis of those cases suggests that conventional accounts that contrast 'rational' bureaucratic expertise against 'irrational' lay perspectives can miss the institutional 'irrationalities' that shape officials' perceptions of risk and associated behaviour. In particular, the paper suggests that complex risk regulation regimes are vulnerable to a phenomenon of 'institutional attenuation'. That term refers to institutional processes that serve to diminish inspectors' perceptions or awareness of a risk, and/or diminish inspectors' perceptions of the policy importance of associated regulations. Furthermore, the paper shows how such institutional attenuation can contribute to ineffective monitoring and enforcement of some risk regulation regimes.

## Introduction

The social shaping of the perception of risks to human health and safety has received much academic and policy attention in recent years. Greatest attention has been paid to the public perception of risk, such as accounts provided by the well-known social amplification of risk framework (Kasperson et al, 1988) or more contextually and culturally embedded approaches (Irwin and Wynne, 1996). Much less attention, however, has been paid to the factors that shape regulatory officials' perceptions of risks to human health and safety and their associated attitudes towards the regulation of such risks. Yet risk regulation regimes are often complex systems that comprise multiple components, which are subject to different pressures and have their own

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micro-cultures (Hood, Rothstein and Baldwin, 2001). As a consequence, officials in different parts of risk regulation regimes may have divergent perceptions of risks and/or divergent attitudes towards their regulation. Such divergence may result in policy being implemented in unintended ways if officials monitoring and enforcing regulation perceive the magnitude and the need for control of certain risks differently to policy-makers. This paper, therefore, investigates the factors that shape officials' perceptions of risks and their regulatory control within risk regulation regimes, and pays particular attention to officials responsible for monitoring and enforcement, and considers the consequences for policy implementation.

As a starting point, it might be assumed that officials' perceptions of certain risks and attitudes towards associated regulation are dominated by highly-informed technical assessments of potential harm and are aligned throughout regimes. That starting point builds on models of 'perfect' regulatory implementation, which logically entail a set of preconditions such as perfect control, obedience and communication within regimes, to ensure policies are implemented as intended. Public administration scholars stress, however, that 'perfect' regulatory implementation is, in practice, unobtainable and even undesirable (e.g. see Hood, 1976; Hogwood and Gunn, 1993). There are a number of institutional reasons why the understanding, attitudes and beliefs of officials are likely to vary within a regime.

First, institutional studies show how communication and control become ever more difficult as hierarchies become larger and fragmented (Hood, 1986: 104ff; Tullock, 1965: 137ff; Downs, 1967: 77). As hierarchies become more complex, implementers may lose out on vital understanding of the meaning, significance and need for specific rules, whilst scrutiny of regulatory implementation by standard-setters becomes more difficult. Information distortion and control problems may be especially significant for the management of knowledge-intensive risk regulation regimes that are implemented by street-level bureaucrats with only limited scientific training. Such problems may be further compounded in situations of scientific uncertainty where policy has to be made on the basis of incomplete and often conflicting information. Moreover, such problems can be aggravated if central government acts to reduce its own business risks in resolving policy uncertainties by delegating resolution of those uncertainties to enforcement authorities (Hood and Rothstein, 2000).

Second, studies of bureaucratic behaviour suggest that bureaucrats' worldviews are related to personal, professional and organisational interests. Some studies suggest, for example, that bureaucrats act in ways that advance their organisation's or their own interests by maximising budgets or by avoiding stressful or unpleasant work (e.g. Niskanen, 1971; Dunleavy, 1991). From that standpoint, the rationales guiding policy-makers in creating individual policies may be very different to the rationales underlying the choices made by street-level bureaucrats in funnelling and prioritising a mass of competing policies (see Baldwin, 1990). A range of factors can influence the exercise of regulatory discretion in implementation, such as the economics and ease of enforcement, the scope for legal discretion, the political context, the character and seriousness of offence, and the character and relationships of regulators and regulatees (see Hood, 1986: Ch.3; Hutter, 1988: 125-6; Lipsky, 1971). From that perspective, the alignment of implementation strategies with regulatory requirements is highly dependent on the institutional reward structures governing the portfolio of responsibilities of those monitoring and enforcing regulation. Regulatory officials'

perceptions of certain risks and associated regulations are, therefore, as likely to be influenced by social and institutional factors as by 'technical' factors, and indeed, it may be hard to disentangle those factors.

From a more general perspective, such constraints on bureaucratic processes are suggested by bounded rationality models, which stress the significance of limited human capacities and organisational environments in structuring bureaucratic attitudes and behaviour (Simon, 1957). From that standpoint, organisational processes are inevitably constrained by the routine filtering and reinterpretation of information and problems in ways that fit with organisational values, beliefs and worldviews (e.g. Hawkins and Thomas, 1989: 7). As a consequence, certain issues and problems may be routinely distorted because of the way that organisations construct their responsibilities and ways of working (Manning, 1989: 61).<sup>2</sup> Similar dynamics are captured by the concept of 'notional normality', whereby working practices are sustained by sufficiently accurate individual and organisational beliefs about the world that can accommodate accumulating problems up to the point that those beliefs are challenged by a major disaster or crisis (Turner and Pidgeon 1997: 71ff). In a similar vein, 'groupthink' decision-making theory, developed in relation to foreign policy failures, suggests that pressures to achieve consensus within small cohesive groups, leads to sometimes catastrophic disregard, or misinterpretation, of danger signals that conflict with the basic set of working assumptions of those groups (Janis, 1972: 197-198).

In the context of risk regulation, such distortion may lead to 'risk amplification' - a well-documented syndrome whereby individuals have an exaggerated perception of the magnitude of certain risks. Alternatively, such distortion may have the opposite effect, which might be termed 'institutional attenuation'. That term refers to institutional processes that serve to diminish inspectors' perceptions or awareness of a risk, and/or diminish inspectors' perceptions of the policy importance of associated regulations. It might be hypothesised that institutional attenuation effects are most likely within large and complex bureaucracies, where those monitoring and enforcing regulations have only limited technical training and/or where there are considerable scientific uncertainties, and where the external and internal pressures on those officials are misaligned with regulatory needs and requirements.

This paper, therefore, seeks to examine three main questions. First, to what extent are perceptions of risk and attitudes towards regulation of officials monitoring and enforcing risk regulation aligned with regulatory requirements? Second, where officials' perceptions and attitudes are not aligned with regulatory requirements, what other factors can explain those perceptions? And third, what impacts do regulatory perceptions of risk and associated regulation have on policy implementation processes and outcomes?

Empirically, the paper examines risk regulation regimes within three policy domains. Those regimes concern occupational exposure to radon, food chemical contamination from plastics food packaging, and bans on potentially BSE-infected bovine offal for

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<sup>2</sup> Social constructionist perspectives similarly focus on how officials construct their regulatory and scientific understandings within the constraints of pre-existing institutional environments, cultures, knowledges, and experiences (e.g. Shackley and Wynne, 1995; Irwin et al, 1997).

human food and animal feed. The first two case studies draw upon a range of primary documentary sources and in-depth, face-to-face interviews with relevant state officials and business representatives,<sup>3</sup> whilst the BSE case study draws on evidence gathered for the Phillips inquiry into BSE (Phillips et al, 2000).

### **Three case studies**

#### **a) Occupational exposure to radon**

The first case study concerns the natural radioactive gas radon, which can accumulate at high concentrations in homes and workplaces in some parts of the country. The orthodox view within the international nuclear scientific community is that exposure to radon can cause lung cancer (see ICRP, 1984; WHO, 1988; Council of the European Communities, 1996), although a number of scientists claim that radon risks are over-stated.<sup>4</sup> The UK government's nuclear advisory body - the National Radiological Protection Board (NRPB) - follows the orthodox view and estimates that radon causes or aggravates about 2,500 lung cancers each year in the UK - about five per cent of all lung cancers (NRPB 1990: 25). Most of these cancers are attributed to exposure in the home but, according to the NRPB, as many as 250 a year may arise from exposure at work.<sup>5</sup> That latter figure is of a similar magnitude to the annual number of workplace fatalities and, if assumed to be correct, presents a serious workplace risk (HSC, 2001: 2).

Radon is subject to EU-based controls that are monitored and enforced by regionally-based health and safety inspectors of the UK's Health and Safety Executive (HSE) in industrial premises, and by local authority inspectors in other workplaces (SI 1999,

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<sup>3</sup> The radon case study draws on previous research conducted with Prof Christopher Hood and Prof Robert Baldwin (see Hood, Rothstein and Baldwin, 2001). In addition to analysis of relevant documentary sources, that research included interviews and correspondence with senior representatives and, where relevant, practicing inspectors of the major relevant regulatory organisations, including: the European Commission; the National Radiological Protection Board; the Health and Safety Executive; the Department of Health; the ex-Department of the Environment, Transport and the Regions; and two Midlands local authorities. The plastics case study similarly draws on documentary analysis and interviews and correspondence with senior representatives and, where relevant, practicing inspectors of the major relevant regulatory organisations, including: the European Commission; the ex-Ministry of Agriculture, Fisheries and Food; the Food Standards Agency; the local authority co-ordinating body – LACOTS; and four UK local authorities. Interviews were also conducted with representatives of two major supermarket chains; as well as an industry consultant with 40 years experience of migration issues.

<sup>4</sup> Some scientists question the models used to estimate radon risks and/or claim that epidemiological data fails to reveal an association between high radon levels and above-normal incidences of lung cancer (see, for example, Cole (1993), discussion in Lubin and Boice (1997) and Edelstein and Makofske (1998: 286)). Some scientists have even suggested that low-level exposure to radiation may be beneficial to health (see Cohen, 1989a, 1989b). A recent government-funded epidemiological study in England (Darby, et al 1998), however, lends support to the orthodox view of the international nuclear science community which rates radon as a serious risk.

<sup>5</sup> At the time of writing there was no officially published figure for expected lung cancer incidence due to occupational exposure in the UK. The figure of 250 was suggested by a senior radon expert at the NRPB (Dixon, 2000).

No. 3232). Health and safety inspection and enforcement activities are, at least in principle, highly risk-based. Regional risk rating systems are employed to identify 'risky' premises and determine inspection frequency and the HSE's Tolerability of Risk framework helps establish acceptable levels of risk in the workplace.

It might, therefore, be expected that inspectors would be alert to radon risks and that controls would be assiduously monitored and enforced where exposures exceed the regulatory limit. Contrary to expectations, however, inspectors have a low awareness of radon issues and despite regulations dating back to 1985 (SI 1985, No.1333), less than 10,000 workplaces have so far been tested out of 110,000 workplaces in England and Wales.<sup>6</sup> A senior radon expert at the NRPB informally suggested that at the current rate it would take over twenty years for all workplaces to be tested. There are a number of reasons why such low attention has been paid to radon.

The first factor concerns inspector expertise. The majority of health and safety field inspectors are generalists, in so far as they deal with a wide spectrum of risks found across workplaces. Inspectors have a traditionally strong focus on readily observable and tractable safety issues rather than chronic and complex health issues (Baldwin, 1987). Radiation regulation is regarded as important, but field inspectors are relatively unfamiliar with radiation issues and the specialist radiation regulations. Instead, radiation monitoring and enforcement tend to be passed on to a handful of nationally-based specialist radiation inspectors who can concentrate on those workplaces that use artificial sources such as nuclear installations, hospitals and educational establishments. That division of labour has meant that field inspectors have been slow to build up awareness of radon issues. Moreover, that lack of radon awareness has been compounded by radon's 'invisibility'. Radon is not readily associated with particular business activities and is only detectable with special apparatus. Therefore, whilst field inspectors are alert to the use of artificial sources of radiation, radon is simply 'off the radar' during routine inspections.

One consequence has been that whilst the HSE's specialist radiation inspectors view radon as a serious problem, generalist field inspectors often have an attenuated perception of radon risks. As an HSE policy official put it, "Some inspectors don't feel comfortable with the subject and some inspectors just don't know about radon. ...When you explain the risks to field inspectors and say that radon causes 250 deaths a year, their eyes light up."

Moreover, radon does not fall easily within the conventional health and safety worldview. In common with many other inspectorates, views of regulatee culpability are an important influence on the exercise of enforcement discretion within health and safety (see Hutter, 1988). Views of culpability are a construct of institutional approaches to different issues and, within the health and safety worldview, failure to take steps to mitigate unfamiliar risks of 'natural' origin entail less employer culpability than risks that are created as a direct result of workplace activities. As such, failure to mitigate radon exposure is seen as entailing less obvious fault or negligence on the part of regulatees than most conventional risks in the workplace.

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<sup>6</sup> At the time of writing there was no published information identifying the number and location of business premises tested. The quoted figure was suggested by a senior radon expert at the NRPB.

The exception is employer failure to heed specific requests to test or remediate because that challenges the regulatory authority of inspectors.<sup>7</sup> Inspectors, otherwise, tend to confine themselves to more familiar and ‘blameworthy’ issues. As the HSE regional official responsible for a major radon-afflicted region of the UK commented, ‘Other issues such as gas cylinders are more likely to be on their minds. If you asked them which was more important, it’s fairly clear what they would reply.’

The lack of radon expertise amongst generalist inspectors has been compounded by the low organisational priority accorded to the issue. Some systematic investigations of occupational radon exposure have been conducted in a few radon hotspots around the country, but those campaigns have been largely dependent on local initiatives. In the local authority cases, campaigns have been dependent on the contingencies of individual local authority priorities where radon can lose out to competing demands on local authority resources and political priorities. In the HSE case, radon control simply does not figure as an important national objective, despite the HSE’s considerable emphasis on non-threshold human carcinogens (HSE, 2001). Instead, radon is largely seen as a regional problem and less politically rewarding than focusing on artificial sources of radiation. Indeed, during the research one HSE official pointed out that this was partly the legacy of the early 1990s when the incumbent government discouraged vigorous enforcement of radon controls as part of its general programme of deregulation. As a senior HSE policy official put it, “There is not a lot of kudos in pushing radon. You get kudos as a regional director for your contribution to the regional and national workplan.” Under such circumstances, inspector perceptions of radon risks and the importance of radon regulation are influenced by the professional opportunity costs of pursuing radon rather than an issue that attracts greater professional rewards.

Inspectors are under few other pressures to tackle radon. Unlike artificial sources of radiation, radon has a very low public profile and has never been a central concern for labour unions, perhaps in part because of its non-sectoral characteristics (see Hood, Rothstein and Baldwin, 2001: Chs. 6, 7). Nor does radon have a high profile with business because it is rarely inherent to particular business activities, unlike most health and safety risks.<sup>8</sup> Few employers will, therefore, routinely include radon in their risk assessment unless they are alerted to the issue or they have specialist radiological knowledge. That is not to say that inspectors encounter resistance to radon controls. Radon controls are relatively cheap and easy to implement, and firms from across sectors have been found to be generally responsive when they have been alerted to the risks.<sup>9</sup> The widespread ignorance of radon in the workplace, however, means that inspectors have to alert businesses to potential radon risks, explain the

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<sup>7</sup> The HSE has served enforcement notices on employers who ignore specific requests to test for radon (see footnote 9)

<sup>8</sup> Exceptions include certain forms of mining and businesses with underground facilities.

<sup>9</sup> Testing and remediation are relatively straightforward and come very cheap with workplace testing and remediation averaging at £160 and £1500 respectively per workplace. One Midlands council, in a rare move, contacted 500 business premises asking them to test for radon and found they only had to serve enforcement notices on 18 who refused to test. Whilst there are no data on remediation, no inspectors interviewed for this research knew of firms refusing to remediate if tests proved positive.



need for expert advice, and ensure that effective controls are implemented where necessary. In the absence of widespread inspector vigilance, radon regulation tends to be neglected and, as a consequence, there has only been slow progress in radon remediation.

## **b) Chemical migration from food contact plastics**

The second case study concerns the chemical contamination of food from food contact plastics. Chemicals leaching (or more technically, ‘migrating’) into food from contacting plastics packaging can contaminate food at levels comparable to some pesticides.<sup>10</sup> Some chemicals can present serious risks to consumers if not adequately controlled,<sup>11</sup> although the toxicity or otherwise of some chemical migrants has occasionally been the subject of some controversy.<sup>12</sup> In the UK, chemical migration has historically been subject to general food safety law and a self-regulatory code of practice, but has been subject to an EU-based regime since the early 1990s.<sup>13</sup> Formal responsibility for monitoring and enforcing compliance has rested with local authority food safety inspectors.

It might be expected that food safety inspectors diligently ensured that business practice complied with general food safety law under the self-regulatory regime and that practice complied with the detailed requirements of the new EU regime in the 1990s. Contrary to those expectations, however, local authority monitoring and enforcement activity was virtually non-existent during the self-regulatory era despite a number of studies, including central government surveillance (MAFF, 1987, 1990), suggesting serious under-performance (see Rothstein, 2003). Even following the introduction of the new EU regime, it took a number of years for inspection activity to increase and that activity has been ad hoc and variable around the country.

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<sup>10</sup> For example, government-conducted studies have shown that chemical plasticisers can migrate at high rates from certain plastics into food (MAFF, 1987, 1990). For other reviews see Katan (1985, 1992).

<sup>11</sup> For example, during the 1970s the human carcinogen vinyl chloride, was discovered to be migrating at high rates into airline spirit miniatures (Katan, 1992). EU regulations now only permit the use of monomers that are classified as genotoxic carcinogens, such as vinyl chloride, acrylonitrile, and butadiene, if they are undetectable in food (Barlow, 1993).

<sup>12</sup> Examples include the public controversy following the publication of a UK government study of plasticiser migration in 1990 (MAFF, 1990; Evening Standard, 1990; EPFMA, 1990; PRW, 1991) and the controversy over proposals to ban phthalate plasticisers from plastic baby toys (ENDS, 1997).

<sup>13</sup> Chemicals migrating from plastics into food have been controlled in the UK by the general provisions of successive Food Safety Acts that food should not be supplied that is injurious to health (see, for example, Food and Drugs Act 1955, Food Act 1984, and the Food Safety Act 1990). Food contact plastics have also been subject to voluntary recommendations on plastics ingredients set out by the British Plastics Federation at the end of the 1950s and later in conjunction with the British Industrial Biological Research Association (BPF, 1958; BPF/BIBRA, 1969). Since 1978 food contact plastics have been covered by an EU framework Directive (implemented in the UK as SI 1978, No. 1927), but with the exception of a specific Directive restricting vinyl chloride (implemented in the UK in 1980 as SI 1980, No.1838), detailed EU regulations setting performance standards for individual plastics ingredients were only slowly introduced from the early 1990s (see SI 1992, No. 3145). For a more extended discussion of the regulation of food contact plastics see Rothstein (2003).

How can the low attention paid to chemical migration, especially during the self-regulatory era, be explained? In terms of expertise, food safety inspectors are drawn from local authority Trading Standards Officers and environmental health officers, and are generally semi-specialists having to cover a wide range of food related issues such as hygiene, composition and contamination. Food safety inspectors, like health and safety inspectors, have a traditional focus on readily-observable, acute food safety issues such as food hygiene.<sup>14</sup> That is not to say that they are unconcerned with chronic and complex health issues, but rather they often need to look for external guidance and support when dealing with such issues. During the self-regulatory era, food safety inspectors generally had little awareness or knowledge of chemical migration issues and were more likely to be concerned about the acute risks of consuming shards of food packaging.

That lack of expertise was compounded by the extreme institutional fragmentation of the self-regulatory regime. Food safety regimes in the UK are institutionally highly fragmented, comprising multiple, independent and physically scattered enforcement authorities - in the form of local authority inspectors - with historically poor linkages to central government and EU standard-setters. Food contact plastics were the policy responsibility of the Ministry of Agriculture, Fisheries and Food (MAFF) in consultation with the Department of Health.<sup>15</sup> Policy-making was further fragmented, however, by the adoption of a self-regulatory approach in which business took responsibility for setting voluntary performance standards within the context of general food safety law. Those arrangements stemmed from a decision by the two ministries to take a hands-off approach to self-regulation and local authority activity, because they did not want to be seen to endorse what they saw as potential conflicts between the self-regulatory regime and the requirements of general food safety law (see Rothstein, 2003). Government did conduct infrequent surveillance on the issue from the 1970s onwards, but according to a senior trading standards official, surveillance information that showed high migration rates was not passed to local authorities for action (e.g. MAFF, 1987, 1990). That left business as the major potential source of information for local authorities but there was little communication between the two.

There were, moreover, technical and legal obstacles to monitoring and enforcement. During the self-regulatory era, there were few legally defensible test methodologies that could be used to establish migration levels, and there were no statutorily-based performance standards that specified acceptable levels of food contamination. In the absence of commonly agreed and practical principles by which compliance could be measured (otherwise known as ‘standard-unequivocality’ (see Hood, 1986: 78), migration from food contact plastics was a difficult issue for food inspectors to pursue. Those obstacles to monitoring and enforcement, coupled with a lack of basic expertise and poor communication of surveillance information within the highly-

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<sup>14</sup> Baldwin (1987) argues that health and safety inspectors have a preference for regulating safety rather than health.

<sup>15</sup> The Food Standards Agency took over policy responsibility for food contact materials regulation in 2000 following the abolition of MAFF.

fragmented regime, contributed to an attenuation of generalist inspectors' perceptions of potential risk from plastics migrants.

Moreover, there were no external pressures pushing the issue onto the enforcement agenda during the self-regulatory era. The issue had a low profile with the general public, the media and even consumer organisations - important factors that can influence the allocation of scarce resources for food safety inspection. In the absence of such pressures, there were few institutional incentives to pursue the issue. Food inspection has historically suffered from under-resourcing, and even today, most inspectors are not dedicated food inspectors and may only deal with food issues one day a week. The opportunity costs of investing resources and energy on migration issues were simply too great for inspectors. As a consequence, migration issues lost out to competing demands on resources that were driven higher up the agenda either by evidence of obvious risk, or by external and local authority political pressures. One local authority food inspector put it at its most extreme, 'It's about our perception of risk. It can be politically-driven fire fighting. If the public, the local press, or members are pushing us to do pesticide residues, then that is what we will do.'

The regime, therefore, relied on the diligence of plastics producers, processors and retailers who could exert considerable influence as commercial intermediaries up the food supply chain. According to one senior retail representative, however, supermarkets historically accorded little priority to chemical migration. In part, that was because enforcement officers rarely raised the issues. The other relevant businesses comprised plastics producers and converters ranging from large multinational companies to hundreds of small firms on industrial estates. Those businesses were at the periphery of the usual sectors dealt with by inspectors. According to a senior local authority trading standards inspector, very alert inspectors may have inspected some of the larger firms. Smaller firms, however, were likely to have been ignored by inspectors, even though those companies were likely to pay least attention to existing voluntary recommendations.

A new, detailed EU regime was introduced into the UK in the early 1990s as part of the EU's harmonisation programme. After a long and difficult period of gestation stretching back to the early 1970s,<sup>16</sup> the new harmonised regime came to grips with a number of problems that had beset the UK's self-regulatory regime. The regime banned a number of toxic chemicals and required substantial toxicological data on more than half the substances used in plastics manufacture, some of which were suspected of serious toxicity.<sup>17</sup> The EU regime was also more standard-unequivocal than the UK's self-regulatory regime by incorporating standard test methodologies and migration limits, which in turn facilitated the development of practical enforcement strategies. Institutional fragmentation was combated by co-operation between the local authority co-ordinating body: LACOTS, the plastics trade

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<sup>16</sup> For example, on the UK's accession to the European Community, the UK government argued against the European Commission's proposals for a comprehensive harmonised regime in favour of broad principles safeguarding human health and ad hoc regulations controlling specific substances (Rossi, 1982).

<sup>17</sup> Substances banned included asbestos, highly-halogenated compounds and bioaccumulating chemicals (SCF, 1993a, 1993b).

association, and other food businesses in developing a new Code of Practice. During the 1990s, central government also started to liaise more closely with local authorities, by co-ordinating surveillance work and improving information flow within the regime. Moreover, inspector awareness of the issue was raised during the 1990s by a number of well-publicised investigations (including central government surveillance) that indicated high migration rates of chemicals that raised toxicological concerns (MAFF, 1990; Colborn et al, 1995).

It took some time, however, to shift inspector attitudes. In the early 1990s, for example, the Institute of Environmental Health Officers had to cancel a conference on the new EU regime due to lack of interest. A number of local authorities did conduct their own ad hoc tests, but those tests were limited in scale and dependent on advocates within the local authorities. In general, local authorities have focused on checking the general food safety management systems of the dominant food industry players who have high reputational stakes in compliance and can exert considerable influence up the food and plastics supply chains. That local authority programme has been accompanied by limited national surveillance, which provides some evidence of business practice and may serve to keep dominant players alert to their responsibilities.<sup>18</sup> There has, therefore, been increased attention to chemical migration during the first ten years of the EU regime. That increase of attention, however, has been slow, with the legacy of regulatory neglect persisting into the regulated era.

### **c) Human and animal SBO bans**

The final case study concerns two related BSE controls on specified bovine offal (SBO). In the late 1980s, SBO was identified as a potential source of BSE infection for cows, other animals and humans. In 1989, the UK government banned SBO for human consumption (SI 1989, No. 2061). Slaughterhouses, however, traditionally sent meat condemned as unfit for human consumption to the renderers for processing into an animal feed compound, risking incorporation of SBO into animal feed. Following a failed voluntary ban, a statutory ban on the sale and supply of animal feed contaminated with SBO was introduced in 1990 (SI 1990, No. 1930).<sup>19</sup> Both bans were monitored and enforced by local authority inspectors until 1995, with central government monitoring of enforcement effectiveness. In 1995, a newly-created national Meat Hygiene Service took responsibility for monitoring and enforcing both bans.

According to the Phillips Inquiry, enforcement of the 1989 human SBO ban was only partially successful. Meat hygiene inspectors largely ensured the separation of SBO from meat intended for human consumption, but failed to ensure that SBO was stained black and, most importantly, that fragments of spinal cord were removed from carcasses before approval (Phillips et al, 2000: §616). The 1990 animal SBO ban, however, was a complete failure. The ban was poorly monitored and enforced, with unfit meat destined for animal feed regularly becoming contaminated with SBO, both by accident and design (Phillips et al, 2000: §457). It took until 1995 before both bans

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<sup>18</sup> Surveillance work on chemical migrants does not match the regular surveillance work on pesticide residues which command greater public and policy attention.

<sup>19</sup> See also Phillips et al (2000: §358ff).

were assiduously monitored and enforced following the introduction of new regulations and the new Meat Hygiene Service.

How is it possible to explain such regulatory under-performance? The first factor was expertise. The human SBO ban was enforced until 1995 by local authority meat hygiene inspectors and Official Veterinary Surgeons (OVSSs) as part of their general responsibilities for enforcing meat hygiene controls in slaughterhouses.<sup>20</sup> Although the requirements of the bans were not beyond the skills of inspectors, BSE was a new disease about which little was known. The closest disease with which inspectors were familiar was scrapie, which was believed not to be transmissible to humans and had been suggested as the most likely cause of BSE by the Southwood Working Party in 1989. Inspectors were, therefore, disposed to interpret the requirements of the human SBO ban in the context of their knowledge of scrapie and the general principles of meat hygiene. In general, inspectors (and indeed, officials within central government) did not appreciate the caveat to the Southwood Report that if BSE was not scrapie-like, then there could be serious implications for human health (Phillips et al, 2000: §285; Millstone and van Zwanenberg, 2001). That meant that inspectors did not appreciate the need for diligence in ensuring the complete removal of even small fragments of spinal cord. Nor were inspectors concerned about the staining and disposal of SBO because that was viewed as a matter for animal health, even though the persistence of BSE in British herds presented continued human health risks (Phillips et al, 2000: §406, §616).

Moreover, the meat hygiene enforcement culture did not dispose inspectors to diligent inspection and enforcement (Phillips et al, 2000: §389, §456). The nature and conditions of work made it hard to recruit committed and highly-qualified staff. The sector had a mixed compliance culture verging on active resistance, with many businesses running at the margins of financial solvency and regarding meat hygiene regulation as unnecessarily burdensome. Many inspectors worked alone and were sometimes subject to violence or intimidation and injury.<sup>21</sup> Sometimes poor quality inspectors were recruited from overseas and often inspectors were so poorly managed that they became captured by the businesses they were meant to be regulating. As a consequence, slaughterhouse standards were poor and meat hygiene inspection was often merely confined to trying to ensure that unfit meat did not go for human consumption (Phillips et al, 2000: §389, §679).

Meanwhile, the animal SBO regulations were overseen by local authority Trading Standards Officers.<sup>22</sup> Whilst Trading Standards Officers may have had some experience with compositional aspects of animal feed, they neither had a traditional presence in slaughterhouses, nor were they meat hygiene specialists who could readily understand the implications of slaughter practices for animal health (Phillips et al, 2000: §470). Moreover, inspectors were confronted by technical and legal difficulties in enforcing the animal SBO ban because it failed to target the risk creators who were best placed to control the risk (see Baldwin, 1995: 157). The animal SBO ban

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<sup>20</sup> Enforced under Food Safety law by Environmental Health Departments of District Councils.

<sup>21</sup> In 2000/01 there were 29 reported incidents of violence or intimidation and 254 work-related injuries amongst Meat Hygiene Service inspectors (FSA, 2001).

<sup>22</sup> Enforced under Animal Health Law by County Councils and Unitary Authorities.

prohibited the sale and supply of animal feed contaminated with SBO, but it did not explicitly prohibit the mixing of SBO with non-SBO material and was even ambiguous as to whether SBO could be used to manufacture animal feed (Phillips et al, 2000: §398). That meant the ban suffered by targeting farmers and feed suppliers at the end of the supply chain where it was hard to check whether feed was derived from SBO, instead of targeting renderers and slaughterhouses at the beginning of the supply chain (Phillips et al, 2000: §379, §399). Trading Standards Officers were, therefore, disposed to neglect the enforcement of the animal SBO ban.

Given the lack of expertise and enforcement culture, inspectors were likely to require institutional guidance on the SBO bans. Inspection and enforcement suffered, however, from institutional fragmentation. The split between central government standard-setting and local authority inspection meant that meat hygiene inspection and enforcement were dependent, at least in part, on local authority priorities. Local authorities, however, regarded slaughterhouses as valuable sources of local employment and, in the context of general deregulatory pressures, committed inadequate resources to meat hygiene inspection and encouraged light-touch enforcement. Little encouragement was given to local authority inspectors to enforce either ban, and the fragmentation of enforcement responsibilities between the two bans made for poor co-ordination between inspectors.

At the same time, central government communication of the importance of the SBO bans was confused. According to Phillips, inspector and business perceptions of risk were heavily coloured by government spin that provided often unwarranted reassurances to the public about BSE (Phillips et al, 2000: §1176-1190; van Zwanenberg and Millstone, 2001: 162). For example, the government publicly presented the human SBO ban merely as an ‘administratively convenient’ way of introducing earlier baby food recommendations; the Meat and Livestock Commission<sup>23</sup> made the exaggerated claim that consumers would need to eat ‘an impossible amount of pure cow brain’ to risk infection; and according to feed industry representatives, government provided repeated reassurances to industry up to 1994 that a large amount of contaminated feed would be needed to infect a cow (Phillips et al, 2000: §210, §357, §565, §645). Such reassurances significantly attenuated enforcement officials’ beliefs in BSE risks to humans. As a consequence, meat hygiene inspectors attempted to ensure that carcasses for human consumption were largely free of SBO but did not diligently check for fragments, and Trading Standards Officers did little to enforce the animal SBO ban (Phillips et al, 2000: §401). As business was reluctant to enforce what they also perceived to be overly-bureaucratic rules, SBO was regularly mixed with unfit meat sent for conversion into animal feed.

Problems in monitoring and enforcing compliance in relation to both bans should have been picked up by the State Veterinary Service, which monitored local authority enforcement for the Ministry of Agriculture, Fisheries and Food (MAFF) (Phillips et al, 2000: §419). The reports of the service were unreliable, however, because Veterinary Officers were unable to make unannounced visits and were often new recruits who, like meat hygiene inspectors, were also easily captured by their regulatees (Phillips et al, 2000: §475-6). Importantly, officers mistakenly painted a

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<sup>23</sup> A non-departmental public body.

satisfactory picture of compliance because they were also influenced by the government's unwarranted assurances that SBO presented few threats to animal and human health (Phillips et al, 2000: §617).

The attenuated perception of risk by those monitoring compliance with the bans resulted in misleading reports back to central government on enforcement efficiency and contributed to MAFF's mistaken belief that the bans were adequately enforced (Phillips et al, 2000: §404). Indeed, this mistaken belief was reinforced by MAFF's confidence that any enforcement slack in the animal SBO ban would be compensated by enforcement of the overlapping provisions of the human SBO ban (Phillips et al, 2000: §403). The evidence suggests, however, that the presence of multiple enforcers presented a classic opportunity for enforcement of the bans to fall between the cracks of enforcement responsibilities rather than providing insurance against failure of one part of the system (cf. Hood, Rothstein and Baldwin, 2001: 176).

In April 1995, a new national agency, the Meat Hygiene Service (MHS) was created in order to bring meat hygiene standards up to European levels (Phillips et al, 2000: §679ff). The MHS employed those that had previously worked for local authorities as meat inspectors and veterinary officers and took over responsibility for enforcing SBO controls. New animal SBO regulations (SI 1995, No. 1928) were introduced that resolved previous difficulties and the new service set out to ensure that both bans were properly enforced and monitored by introducing staff training and awareness-raising programmes. Performance had increased significantly by September, but there were still widespread failures and it became clear that industry and inspector attitudes were persisting into the new regulatory regime (Phillips et al, 2000: §462). It was only at the end of the year, when some contaminated carcasses approved for human consumption were discovered, that a 'disciplinary purge' was initiated at Ministerial level that eventually ensured the highest rates of enforcement and compliance with both SBO bans (Phillips et al, 2000: §685, §742).

### **Institutional 'irrationalities' and institutional attenuation**

This paper has outlined three risk regulation regimes that have been marked by low levels of monitoring and enforcement. All three risks are associated with varying degrees of scientific uncertainty and debate, and it could be argued that the low levels of regulatory activities were simply a response to the contentious nature of the risks involved. Scientific uncertainties can certainly contribute to policy uncertainties and reduce incentives for regulatory intervention. For example, organisations may favour a strategy of 'muddling through' in the face of uncertainty by adopting incremental and iterative problem-solving methods (see Lindblom, 1959; Gifford, 1989).

Whilst scientific uncertainties undoubtedly had an impact on the timing and form of policy-making within each regime, the state of existing scientific knowledge alone cannot directly account for the observed low attention to monitoring and enforcement. For example, radon regulations did not require inspectors to assess the pros and cons of scientific evidence that radon poses risks to human health, but merely to assess whether radon concentrations exceeded statutory limits. Similarly, in the SBO case, the SBO bans did not require meat hygiene and animal health inspectors to assess the scientific evidence on the transmissibility of BSE to humans and other animals, but just to ensure that all SBO was removed from human and animal food chains.

Instead, the case studies point to a different kind of uncertainty underlying the neglect of monitoring and enforcement activities. In general, the case studies suggest that inspectors had little awareness, or a diminished perception, of the potential risks that policy set out to control, little knowledge of the risk assessments informing policy, and little appreciation of the consequent implications of regulatory neglect for risk management. In some cases, inspectors may have chosen to ally themselves to alternative or heterodox scientific positions that suggested the potential risks were less than suggested by government scientific advisors and policy-makers. Indeed, the SBO case provides evidence of how and why inspectors did not believe in the transmissibility of BSE to humans and other animals. Whichever the form of misalignment between policy and practice, all three case studies suggested significant failures to compensate for those problems within regulatory bureaucracies. Indeed, the case studies suggest that a number of common institutional factors can be identified that actively attenuate monitoring and enforcement officials' perceptions of certain risks and diminish their attention to associated regulatory requirements.

The concept of 'institutional attenuation' draws an inverse analogy with the social amplification of risk literature (Kasperson et al, 1988). That literature considers how the major transmitters of information to the public on risk, particularly the media, can serve to amplify lay public perceptions of risk through the volume and style of reporting. That literature also posits a complementary dynamic of social attenuation of risk, whereby the public pays little attention to well-documented and significant hazards, although that phenomenon is less well investigated.

The social amplification of risk framework has weaknesses in so far as it tends to rely on a deficit model of public attitudes towards risk and plays down the complex social processes underlying the shaping of public perceptions (Irwin, 1995). Moreover, such models tend to focus on irrational lay public perspectives but rarely symmetrically consider the shaping of bureaucratic perceptions, which are often equated with 'expert' perceptions. Commentators such as Breyer (1993), for example, tend to draw contrasts between rational risk approaches of bureaucratic professionals and irrational lay perspectives.

This study suggests, however, that such contrasts may be too one-sided. Indeed, the transposition of social amplification and attenuation concepts into institutional contexts has some appeal for describing the processes shaping officials' understanding and perception of risk and attitudes towards regulation. In particular, the case studies suggest that a host of institutional factors can combine to diminish the perception of risk and attention to associated regulatory requirements by officials monitoring and enforcing risk regulation, leading to regulatory neglect.

First, the case studies identify institutional fragmentation as an important shaping force. Institutional fragmentation is not always problematic, and indeed, there are good reasons why regimes composed of multiple units may be more resilient, efficient, and innovative than those that are less diversely constituted (see Hood et al, 2001: 174). In the cases discussed in this paper, however, institutional fragmentation had a dysfunctional impact by contributing to the attenuation of regulatory understandings and perceptions of risk. Such effects were most clearly evident in relation to the local authority enforcement regimes, which comprised multiple,



independent and physically scattered enforcement authorities institutionally divorced from central government, EU and business standard-setters. Within those fragmented regimes, communication of the meaning and significance of regulatory rules was obstructed and distorted, and overall control made more difficult, as might be predicted by institutional considerations (e.g. Tullock, 1965; Downs, 1967).

Institutional fragmentation presented a ‘too many cooks’ communication and control problem in the SBO cases, by creating fertile opportunities for conflicting institutional interests to arise within the regimes and confound the intention of policy-makers. In those cases, local authorities charged with policy implementation placed little emphasis on meat hygiene and, indeed, encouraged light-touch enforcement. Moreover, judgements of risk by meat hygiene inspectors and Trading Standards Officers were adversely influenced by central government public relations that sought to allay public fears. That not only had the effect of distorting top-down communication but also meant that decision-makers were reliant on misleading information on implementation effectiveness. Communication within the meat hygiene regime effectively resembled a Tower of Babel (cf. Dunsire, 1978: 175ff).

In a variant of the same theme, the plastics case suffered from having ‘no cook at all’. In that case, the self-regulatory arrangements inhibited communication between business, central government and local authorities so that there was little opportunity for developing or sharing scientific and regulatory knowledge between the groups. Moreover, the institutional arrangements contributed to significant control problems because responsibilities for setting compliance standards, monitoring and enforcement were blurred between business, local authorities and central government.

Institutional fragmentation, in fact, suited central government in the plastics case. In the late 1950s, it had explicitly taken a hands-off approach to self-regulation in order to minimise the institutional risk of endorsing a self-regulatory regime that potentially conflicted with general food safety law (see Rothstein, 2003). That blame-avoidance behaviour effectively shuffled residual statutory responsibilities onto local authorities. The issue, however, simply did not figure in local authority priorities given the uncertainties that inspectors faced in enforcing food law in that sector and the absence of a strong steer from government or other external pressures demanding action.

In general, all three cases show the significance of the misalignment of institutional reward structures with regulatory requirements. Institutional incentives are important shapers of the behaviour of regulatory officials, so that if officials reap insufficient reward for monitoring and enforcing what may be difficult, unpleasant, or resource-intensive regulation, then that regulation may suffer neglect. Indeed, the research suggests that the institutional opportunity costs of active monitoring and enforcement were too high in all three cases. Fragmented regimes are likely to be especially prone to such problems because there are greater opportunities for divergence between the rationales guiding the development of policy and the rationales guiding monitoring and enforcement. Indeed, institutional incentives for monitoring and enforcement were only aligned in the SBO cases following the introduction of a new nationwide agency.

Relatedly, the case studies show how bureaucrats’ perceptions of certain risks and attitudes towards associated regulation can become entrenched within disparate and,

in the most extreme cases, incompatible regulatory cultures within regulatory bureaucracies. Cultural theorists argue that individuals interpret and perceive risks according to particular cultural biases that comprise a host of socially grounded values, beliefs and accumulated experiences (e.g. Douglas and Wildavsky, 1982). Risk regulation cultures are often characterised as hierarchist, but recent research shows that multiple regulatory cultures can coexist within risk regulation regimes (e.g. Hood, Rothstein and Baldwin, 2001: 130). This paper shows the importance of regulatory cultures in mediating the understanding and attention given to different risk issues. In so doing, the paper shows the ways in which officials construct their regulatory understandings within the constraints of pre-existing institutional environments, relationships, knowledges and experiences.

In the occupational radon case, for example, policy-making was broadly technocratic with decision-making heavily influenced by the international nuclear expert community, which viewed radon as posing a potentially serious human health risk. Inspection and enforcement activities, however, were more pragmatic. Radon fell outside of the focus of generalist inspectors on the ground, because it did not arise from business activities, was undetectable without special apparatus, and fell within the domain of radiological risks that were usually left to specialists. Instead, inspectors tended to focus on the better known, obvious and readily-resolvable risks. Moreover, inspectors received few institutional rewards for tackling radon at the expense of other risks that contributed to the achievement of national targets. That context, therefore, disposed inspectors to disregard routinely the issue of radon exposure in the workplace unless it was actively, regionally prioritised or inspectors had special knowledge themselves.

In the food contact plastics case, food safety inspectors worked within a culture that stressed both technical risk assessment and local political priorities. In that context, chemical migrants were likely to figure less highly on inspection agendas than other types of contaminants that had a higher profile amongst the public and pressure groups. Pesticide residues, for example, were regularly put on both local authority and central government agendas by locally and nationally organised campaigns. Moreover, the food contact plastics case provided some evidence that inspectors' perceptions of risk and attention to regulation is allied to the ease of the task facing inspectors. In particular, technical and legal problems provided classic scope for the exercise of regulatory discretion (see Baldwin, 1995: Ch. 3; Hood, 1986: 111ff) and deterred inspectors from tackling migration issues. Such a preference for 'doing the doable' at the expense of tackling more complex issues is a common form of bureaucratic behaviour known as the 'bureaucratic paradox' (Schaffer and Lamb, 1981).

The importance of regulatory cultures in the case of the SBO bans was even clearer. The picture painted by the Phillips Inquiry of policy-making in central government barely equated with what might be expected of a hierarchist risk bureaucracy (see also Millstone and van Zwanenberg, 2001). Indeed, MAFF's adherence to the belief, during the late 1980s and early 1990s, that BSE was not transmissible to humans could be described as a groupthink problem, in so far as officials paid insufficient attention to accumulating contrary evidence that had less palatable implications. Meat hygiene enforcement practices, however, most closely resembled a coping and fatalist implementation culture that was ill-disposed to the enforcement of the SBO bans.

Furthermore, in the animal SBO case, legal ambiguities and poor targeting further deterred Trading Standards Officers from active inspection and enforcement for similar reasons found in the plastics migration case.

Moreover, the case studies demonstrate the persistence of regulatory cultures. Simple changes in the law, and even institutional reorganisation, are not always mirrored by changes in enforcement behaviour if implementation of the law disrupts or conflicts with the worldview of enforcers and their relationships with regulatees. The importance of cultures persisting beyond regime changes has been demonstrated elsewhere in relation to the enforcement of dangerous dogs law (see Hood, Rothstein and Baldwin, 2001: Ch.7). In these case studies, the slow pace of change within the food contact plastics regime, shows how the introduction of the new EU regime took a considerable time to impact on local authority inspector behaviour.

The creation of the Meat Hygiene Service in 1995 provided the clearest example of the persistence of regulatory cultures. That agency provided a new and less fragmented model of meat hygiene inspection, providing greater opportunities for direct communication, scrutiny and control of inspectors than the local authority model had previously permitted. In addition, the revision of the animal SBO ban remedied the technical and legal problems that had previously beset enforcement. The service was staffed, however, with local authority inspectors and it was quickly discovered that the old ways of working persisted into the new regime. Slack enforcement of the SBO rules persisted into late 1995, even though training schemes were implemented to change behaviour patterns. Indeed, it took the Minister to read the riot act to both inspectors and business before high levels of compliance were assured and a new occupational culture established.

In general, the case studies in this paper suggest that the perception of risk and attention to regulatory requirements by regulatory officials monitoring and enforcing regulation, are intimately related to the institutional contexts and cultures within which those officials work, and the specific problems and pressures they face in managing those risks. From a bounded rationality perspective, officials' understandings and perceptions of risk are bounded within organisational paradigms of what is possible, legitimate and important (e.g. Hawkins and Thomas, 1989: 7; Manning, 1989: 61).<sup>24</sup> Complementary work on groupthink (Janis, 1972) and notional normality (Turner and Pidgeon, 1997) similarly invoke models of organisational behaviour that filter out problems that threaten or undermine organisational practices at the expense of long-term problem-solving. From such standpoints, rationales guiding bureaucratic perceptions of risk and behaviour embody institutional 'irrationalities' and, as such, are likely to diverge from often posited, but rarely examined, 'expert' or 'objective' rationales. As a consequence, officials' perceptions of issues and problems can become attenuated if they do not fit with experience, are less comprehensible, or fit awkwardly with the central mission of an organisation.

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<sup>24</sup> Analogous points have been made in analyses of the character of regulatory scientific knowledge within policy-making in risk regulation regimes (see Irwin et al, 1997; Shackley and Wynne, 1995).

Such tendencies can contribute to systematic and persistent regulatory failures that can become institutionalised within certain regime settings. The case studies show how distorting institutional incentives and pressures, and the absence of active regime-wide mechanisms for scrutinising and correcting bureaucratic behaviour, can result in routine regulatory neglect. Within such a context, unfamiliar, difficult or uncertain issues can falsely appear as amenable to habitual practice and may be ‘muddled through’, to use Lindblom’s terminology, in ways that achieve institutionally satisfactory outcomes whilst failing to meet intended regulatory goals (Lindblom, 1959; Gifford, 1989: 246).

## **Conclusions**

Three conclusions are drawn from this study. First, the study contributes to a hitherto under-researched dimension of the social shaping of the perception of risk and its control within risk bureaucracies. In particular, the study suggests that the often-posed dichotomy between expert and lay public perceptions of risk, misses the significant ways in which bureaucratic perceptions of risk are shaped by social and institutional processes even within the most archetypal ‘risk bureaucracies’. In contrast, to work in the risk amplification field, the study suggests that the institutional dynamics of risk bureaucracies can serve to attenuate bureaucrats’ perceptions of risk and diminish their attention to associated regulatory requirements. Indeed, it may be that the oft-stated gap between expert and lay perceptions of risk is driven in many cases as much by institutional ‘irrationalities’ as lay ‘irrationalities’.

Second, the study highlights five institutional factors that can combine to diminish the perception of risk and attention to regulation by regulatory officials monitoring and enforcing regulation.

- i. Institutional attenuation effects are most likely when officials monitoring and enforcing regulation are confronted with unfamiliar risks and insufficient attention has been paid to remedying expertise deficits within the regime as a whole.
- ii. Institutional fragmentation can, in some cases, contribute to information distortion and control problems and can make it harder to compensate for misalignment of bureaucratic behaviour and regulatory demands.
- iii. Such misalignments are particularly critical if central government passes the buck in attempting to resolve policy uncertainties by shifting responsibility onto enforcement officials.
- iv. Bureaucrats’ attention to regulatory requirements are likely to be diminished by a range of well-established obstacles to effective monitoring and enforcement if institutional incentives are not orientated towards overcoming those obstacles.
- v. Institutional fragmentation can result in multiple regulatory cultures that dispose those charged with monitoring and enforcement to understand and respond to risks differently to those charged with policy-making.

Finally, the study suggests that the internal workings of regulatory regimes need to be considered in analysing the conditions for regime success and failure. Whilst other factors may play an important role in regime failure, the study suggests that institutional attenuation effects can contribute to regulatory neglect and serious failures in monitoring and enforcing risk regulation. In order to establish the

frequency of this phenomenon, further research is required beyond the three UK regimes discussed in this paper. Moreover, further research is required to establish whether such attenuation effects can occur within policy-making as well as monitoring and enforcement components that are, for example, marked by high degrees of institutional fragmentation, such as between the EU and national governments, multiple central government departments, or advisory bodies. Finally, on symmetrical grounds, there may be circumstances in which institutional factors serve to amplify rather than attenuate the perception of risk of officials monitoring and enforcing risk regulation. That phenomenon was not demonstrated in the three case studies considered in this paper, but deserves further research.

## References

- Ayres, I. and Braithwaite, J. (1992) Responsive Regulation: transcending the regulation debate. Oxford: Oxford University Press.
- Baldwin, R. (1987) 'Health and Safety at Work: consensus and self-regulation' in Baldwin, R. and McCrudden, C. Regulation and Public Law. London: Weidenfeld and Nicholson.
- Baldwin, R. (1995) Rules and Government. Oxford: Oxford University Press.
- Baldwin, R. (1990) Why Rules Don't Work 53 Modern Law Review 321.
- Barlow, S. (1993) 'The Role of the Scientific Committee for Food in Evaluating Plastics for Packaging' in Commission of the European Communities Practical Guide No.1: A Practical Guide for Users of EEC Directives on Materials and Articles Intended to Come into Contact with Foodstuffs, CS/PM/2024. Brussels: Commission of the European Communities.
- Breyer, S. (1993). Breaking the Vicious Cycle. Cambridge, MA: Harvard University Press.
- British Plastics Federation (BPF) (1958) Report of the Toxicity Sub-Committee of the Main Technical Committee, Publication No.40. London: British Plastics Federation.
- British Plastics Federation/ British Industrial Biological Research Association (BPF/BIBRA) (1969) Plastics for Food Contact Applications - A Code of Practice for Safety in Use. London: British Plastics Federation.
- Cohen, B. (1989a) 'Correlation between Mean Radon Levels and Lung Cancer Rates in US Counties: A Test of the Linear No Threshold Theory' in Proceedings of the 1988 EPA International Symposium on Radon and Radon Reduction Technology. Denver, Report EPA-600/9-89-006a.
- Cohen, B. (1989b) 'Expected Indoor Rn-222 Levels in Counties with Very High and Very Low Lung Cancer Rates'. Health Physics, 57: 897-907.
- Colborn, T., Myers, J. and Dumanoski, D. (1995) Our Stolen Future. London: Little, Brown and Company.
- Cole, L. (1993) Element of Risk: The Politics of Radon. Washington DC: American Association for the Advancement of Science.
- Council of the European Communities (1996) 'Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation'. Official Journal of the European Communities, 39, (L 159): 1-114.
- Darby, S., Whitley, E., Silcocks, P., Thakrar, B., Green, M., Lomas, P., Miles, J., Reeves, G., Fearn, T. and Doll, R. (1998) 'Risk of Lung Cancer Associated with

Residential Radon Exposure in South-West England: A Case-Control Study', British Journal of Cancer, 78: 394–408.

Dixon, D. (2000) Personal communication with D. Dixon, National Radiological Protection Board (15.9.2000)

Douglas, M. and Wildavsky, A. (1982) Risk and Culture. Berkeley: University of California Press.

Downs, A. (1967) Inside Bureaucracy. Boston: Little, Brown and Company.

Dunsire, A. (1978) The Execution Process (Vol.1): Implementation in a bureaucracy. Oxford: Martin Robertson.

Dunleavy, P. (1991) Democracy, Bureaucracy and Public Choice: economic explanations in political science. London: Harvester.

Edelstein, M. and Makofske, W. (1998) Radon's Deadly Daughters. Lanham, Maryland: Rowman and Littlefield Publishers, Inc.

Environmental Data Services (ENDS) (1997) 'Hormone chemical fears hit PVC baby toys', ENDS Environment Daily, Issue 78 (28.5.1997).

European Plasticized Pvc Film Manufacturers Association (EPFMA) (1990) 'Top Scientists Hits Back at Cling Film Scare', News Release, PVC Cling Film Information Bureau (22.11.1990).

Evening Standard (1990) 'Plastic Food Wrap Warning', Evening Standard (12.11.1990).

The Food and Drugs Act (1955) London: HMSO.

The Food Act (1984) London: HMSO.

The Food Safety Act (1990) London: HMSO.

Food Standards Agency (2001) 'The Meat Hygiene Service'. Food Standards Agency News, 11. London: Food Standards Agency: 6-7.

Gifford, D. (1989) 'Discretionary Decisionmaking in Regulatory Agencies: A Conceptual Framework' in Hawkins, K. and Thomas, J. (eds.) Making Regulatory Policy. Pittsburgh: Pittsburgh University Press: 233-261.

Hawkins, K. and Thomas, J. (eds.) (1989) Making Regulatory Policy. Pittsburgh: Pittsburgh University Press.

Health and Safety Commission (HSC) (2001) Health and Safety Statistics 2000/01: Statistics of workplace injury, gas safety, dangerous occurrences and enforcement action. London: HSE Books.

Health and Safety Executive (HSE) (2001) Reducing Risks, Protecting People. London: HSE.

Hogwood, B. and Gunn, L. (1993) 'Why 'Perfect Implementation' is Impossible' in Hill, M. The Policy Process: a reader. New York: Harvester Wheatsheaf.

Hood, C. (1976) The Limits of Administration. London: Wiley.

Hood, C. (1986) Administrative Analysis: An introduction to rules, enforcement and organizations. Sussex: Wheatsheaf Books.

Hood, C. and Rothstein, H. (2000) Business Risk Management in Government: Pitfalls and Possibilities. London: National Audit Office.

Hood, C., Rothstein, H. and Baldwin, R. (2001) The Government of Risk: understanding risk regulation regimes. Oxford: Oxford University Press.

Hutter, B. (1988) The Reasonable Arm of the Law?: the law enforcement procedures of environmental health officers. Oxford: Clarendon.

International Commission on Radiological Protection (ICRP) (1984) 'Principles for Limiting Exposure of the Public to Natural Sources of Radiation.' Annals of the ICRP, 14 (1): 1-8. ICRP Publication 39.

Irwin, A. (1995) Citizen Science: a study of people, expertise and sustainable development. London: Routledge.

Irwin, A. and Wynne, B. (eds.) (1996) Misunderstanding Science? the public reconstruction of science and technology. Cambridge: Cambridge University Press.

Irwin, A., Rothstein H., Yearley S. and McCarthy E. (1997) 'Regulatory Science - Towards a Sociological Framework', Futures, 29: 17 -31.

Janis, I. (1982) Victims of Groupthink, 2nd edition. Boston: Houghton Mifflin.

Kasperson, R.E., Renn, O. and Slovic, P (1988) 'The social amplification of risk: a conceptual framework', Risk Analysis, 8: 177-187.

Katan, L. (1985) 'Contamination from Packaging Materials' in Gibson, G. and Walker, R. (eds.) Food Toxicology - Real or Imaginary Problems. London: Taylor and Francis.

Katan, L. (1992) 'Multiplicity of Migrants', Nature, 358: 183 (16.7.1992).

Lindblom, C. (1958) 'The Science of Muddling Through', Public Administration Review, 19: 78-88.

Lipsky, M. (1971) 'Street Level Bureaucracy and the Analysis of Urban Reform', Urban Affairs Quarterly, 6: 391-409.



Lubin, J. and Boice, J. (1997). 'Lung Cancer Risk from Residential Radon: Meta-Analysis of Eight Epidemiological Studies', Journal of the National Cancer Institute, 89: 49–57.

Manning, P. (1989) 'The Limits of Knowledge: The Role of Information in Regulation' in Hawkins, K. and Thomas, J. (eds.) Making Regulatory Policy. Pittsburgh: Pittsburgh University Press: 49-87.

Millstone, E. and Van Zwanenberg, P. (2001) 'Politics of Expert Advice: lessons from the early history of the BSE saga', Science and Public Policy, 28: 99-112.

Ministry of Agriculture, Fisheries and Food (MAFF) (1987) 'Survey of Plasticiser Levels in Food Contact Materials and in Food', Food Surveillance Paper No.21. London: HMSO.

Ministry of Agriculture, Fisheries and Food (MAFF) (1990) 'Plasticisers: Continuing Surveillance', Food Surveillance Paper No.30. London: HMSO.

National Radiological Protection Board (NRPB) (1990) 'Board Statement on Radon in Homes', Documents of the NRPB, 1: 17–32. Didcot: NRPB.

Niskanen, W. (1971). Bureaucracy and Representative Government. Chicago: Aldine Atherton.

Lord Phillips of Worth Matravers, Bridgeman, J. and Ferguson-Smith, M. (2000) The BSE Inquiry: Volume 1. London: The Stationery Office.

Plastics and Rubber Weekly (PRW) (1991) 'Radio comments on PVC cling film judged unfair', Plastics and Rubber Weekly (13.4.1991).

Rossi, L. (1982) 'Current Prospects for Community Legislation on Plastics Materials and Articles Intended to Come into Contact with Foodstuffs' in Katan, L. (ed.) Food Packaging Legislation: US/EEC Perspectives. International Symposium on Food Packaging Legislation, London, 31 March - 1 April 1982. Oxford: Elsevier International Bulletins.

Rothstein, H. (2003) 'Risk Management Under Wraps: self-regulation and the case of food contact plastics', Journal of Risk Research, 6.

Schaffer, B. and Lamb, G. (1981). Can Equity be Organized? Farnborough: Gower.

Scientific Committee for Food (SCF) (1993a) Consolidated Report of the SCF on Certain Monomers: Materials and Articles Intended to Come into Contact with Foodstuffs, CS/PM/2072. Brussels: Commission of the European Communities (25.4.1993).

Scientific Committee for Food (SCF) (1993b) Consolidated Report of the SCF on Certain Additives: Materials and Articles Intended to Come into Contact with Foodstuffs, CS/PM/2073. Brussels: Commission of the European Communities (24.5.1993).

- Simon, H. (1957) Administrative Behaviour, 2nd edition. New York: Free Press.
- Shackley, S. and Wynne B. (1995) 'Global climate change: the mutual construction of an emergent science-policy domain', Science and Public Policy, 22: 218–230.
- Statutory Instrument (SI) (1985) No. 1333 The Ionising Radiations Regulations 1985. London: HMSO.
- Statutory Instrument (SI) (1989) No. 2061 The Bovine Offal (Prohibition) Regulations 1989. London: HMSO.
- Statutory Instrument (SI) (1990) No. 1930 The Bovine Spongiform Encephalopathy (No.2) Amendment Order 1990. London: HMSO.
- Statutory Instrument (SI) (1992) No. 3145 The Plastic Materials and Articles in Contact with Food Regulations. London: HMSO.
- Statutory Instrument (SI) (1995) No. 1928 The Specified Bovine Offal Order 1995. London: HMSO.
- Statutory Instrument (SI) (1999) No. 3232 The Ionising Radiations Regulations 1999. London: HMSO.
- Tullock, G. (1965) The Politics of Bureaucracy. Washington D.C.: Public Affairs Press.
- Turner, B. and Pidgeon, N. (1997) Man-Made Disasters, 2nd edition. Oxford: Butterworth-Heinemann.
- Van Zwanenberg, P. and Millstone, E. (2001) "'Mad-Cow Disease' 1980s-2000: how reassurances undermined precaution' in European Environment Agency, Late lessons from early warnings: the precautionary principle 1896–2000, Environmental issue report No 22: 157-167. Luxembourg: Office for Official Publications of the European Communities.
- World Health Organisation (WHO) (1988) Air Quality Guidelines for Europe, No. 23. Copenhagen: WHO.